phecy of the foreigner proved by its fulfilment the errors of the Chinese mathematician, who retired in disgrace from the position which he held. He went back to his home to write the book called "The Inevitable Exposure," which contained a series of calumnies and grossly untrue accusations against the Jesuit fathers. This bad book made him much more notorious than his works on mathematics. The unscrupulous enemies of the Westerns have reprinted it again and again, and they still do so. Very different was the tone of Mei Wu-ngan, who was invited three days in succession by the Emperor Kanghi to converse with him upon mathematical subjects. He had a fondness for mathematics, and read voraciously. He was therefore in a position to criticize Western knowledge in an appreciative manner.

THE additions to the Zoological Society's Gardens during the past week include two Grizzly Bears (*Ursus horribilis*) from the Missouri Brakes, Montana, U.S.A., presented by Mr. Ewen Somerlid Cameron; a Raccoon (*Procyon lotor*) from the Catskill Mountains, New York State, presented by Mr. James H. Frodsham; a Greater Black-backed Gull (*Larus marinus*), a Herring Gull (*Larus argentatus*), British, presented by Mr. A M. Bailey; a Common Tern (*Sterna hirundo*), British, presented by Mr. A. C. Howard; two Mississippi Alligators (*Alligator mississippiensis*) from the Mississippi, presented by Miss Edith Baker; a Macaque Monkey (*Macacus cynomolgus* ♂) from India, a Great Kangaroo (*Macropus giganteus* ♂) from Australia, deposited; a Horned Screamer (*Palamedea cornuta*) from the Amazons, three Violet Tanagers (*Euphonia violacea*) from Brazil, an Ocellated Sand Skink (*Seps ocellata*), South European, purchased; a Chestnut-breasted Duck (*Anas castanea*) from Australia, received in exchange; a Crested Pigeon (*Ocyphaps lophotes*) bred in the Gardens.

OUR ASTRONOMICAL COLUMN.

OBJECTS FOR THE SPECTROSCOPE.

Sidereal Time at Greenwich at 10 p.m. on October 9 = 23h. 13m. 52s.

Name.	Mag.	Colour.	R.A. 1890.	Decl. 1890.
			h. m. s.	° ′
(1) G.C. 4892	—	—	22 59 26	+11 44
(2) G.C. 4921	—	—	23 10 22	+ 5 46
(3) χ Aquarii...	5	Yellowish-red.	23 11 9	− 8 13
(4) ξ Pegasi	5	Yellowish-white.	22 40 26	+11 40
(5) 19 Piscium	6	Red.	23 40 46	+ 2 52
(6) R Aquilæ	Var.	Very red.	19 1 5	+ 8 4

Remarks.

(1 and 2) Neither of these nebulæ have yet had their spectra recorded. The first of them is about 4′ long by 2′ broad, and has been described as "a streak tapering at each end"; in the General Catalogue it is described as "pretty bright; considerably large; much elongated in the direction 11°·9; between two stars." The second is described as "considerably bright; pretty small; irregularly round; pretty suddenly brighter in the middle." They are both very conveniently situated for observation.

(3) The spectrum of this star is a very fine one of Group II., all the bands being wide and dark. Carbon comparisons will probably be the most valuable observations of this star, the character of the spectrum indicating that the flutings should be considerably bright.

(4) Secchi thought that this star had a banded spectrum, but Dunér states that it is one of the solar type ("Sp. II.*a* ! du type le plus pur"). It still requires observing with reference to Groups III. and V.

(5) The spectrum of this star is one of the very finest of its class (Group VI.). It has been observed in considerable detail by Vogel and Dunér. All the principal and secondary bands are well visible. The carbon band 6 (λ 564) is stated by Dunér to be feebler than the others, and so far as we yet know this is the only band in which any considerable variation is established. It will be remembered that this is the cometary band which varies most, but in comets it varies in position also. It seems possible, therefore, that it may also change in position as well as in intensity in stars of Group VI. Comparisons with a spirit-lamp flame would easily decide this point.

(6) This variable has a well-marked spectrum of Group II. Dunér describes it as "very fine," and states that the bands are very wide and dark throughout the spectrum. The period is about 345 days, and it ranges from 6·4–7·4 at maximum to 10·9–11·2 at minimum. The star falls in species 9 of the subdivision of Group II., and if it behaves like other variables with similar spectra, bright lines should appear at or about maximum. The spectrum should also be observed for brightenings of the carbon flutings.

A. FOWLER.

OBSERVATIONS OF COMETS.—Prof. E. E. Barnard, of Lick Observatory, contributes a note on Comets 1889 I. and II. to the *Astronomical Journal*, No. 225, and makes some suggestions as to the possibility of seeing the short-period comets at aphelion. The majority of observers neglect comets as soon as they become faint or difficult to see. Prof. Barnard has made it a point to take up comets when they have been dropped elsewhere, and to observe them as long as they can be seen. Comet 1889 I. has been observed at Lick Observatory from September 2, 1888, to August 18, 1890—that is, for very nearly two years; and Comet 1889 II. from March 31, 1889, to August 24, 1890—that is, for 16 months 24 days: hence the duration of visibility of each exceeds that of the great comet of 1811, which was followed for 16 months 20 days. At the observation of Comet I. 1889, on August 17, its distance from the sun was 6·25 times the earth's mean distance. On August 24, Comet II. 1889 was 5·06 times the same unit from the sun, and Prof. Barnard thinks he will be able to follow it for quite six months longer. The following are the aphelion distances of short-period comets (excepting Tuttle's) recognized at more than one return:—

Encke's	4·10	Brorsen's ...	5·66
Tempel's II. ...	4·66	D'Arrest's ...	5·72
Tempel's I. ...	4·82	Faye's ...	5·92
Swift's 1880 ...	5·14	Biela's ...	6·19
Winnecke's ...	5·50		

It will be seen that Comet I. 1889 is now being observed at a distance from the sun greater than it is possible for any of the short-period comets to attain. It would appear, therefore, that some of the latter class of comets ought to be followed throughout their entire orbits.

PHOTOGRAPHING STARS IN THE DAYTIME.—In the *Astronomical Journal* for September 16, 1889, Prof. Holden gave an elementary theory of the subject of photographing stars projected against a bright background. He showed that, if the intrinsic brilliancy of a star be ten times as great as its background, the photographic image in the Lick telescope was 4124 times brighter than that of the sky. It was also proved that small photographic contrasts of this character could be increased with a given telescope by simply cutting down the aperture. Recently, Prof. Holden writes (*Astr. Journ.*, September 19, 1890), "the question has been examined experimentally by Mr. W. W. Campbell and myself, using the great telescope (focus, 570 inches) and apertures of 33, 15, 8, and 4 inches. Photographs of Venus, Mercury, the moon, and of Alpha Lyræ have been taken in broad daylight (2 to 5 p.m.) with the apertures named, with a constant exposure of 0·13s., and on Seed 26 plates. In general, the smallest apertures used have given the darkest images, as demanded by the theory."

PHYSICS AT THE BRITISH ASSOCIATION.

IN Section A, nine Reports of Committees and fifty-four papers were read. Perhaps the distinguishing characteristic of the Section is its tendency to bifurcation on the slightest provocation. Several Sections do not meet at all on the Saturday, and manage to get through their business comfortably by the Tuesday. Not so Section A. On the Saturday, under the influence of electrolytical attractions and repulsions, there occurred a dissociation of the Section into its constituent elements, accompanied by a migration of ions from places of high potential (in a Bramwellian sense) to places of low, or *vice versâ*. In accordance with the law of ionic migration enunciated by Sir Frederick at the concluding meeting, the ions collected at the kathode were found to far exceed in number those collected at the anode.

To give even an outline of all the voluminous and multitudinous contributions to the Section would occupy many pages, and would require that the writer should have received the training of a Succi or a Jacques before undertaking the task.

M. Du Bois read a paper on refraction and dispersion in certain metals. Kundt's method of observation with very thin electrolytic metal biprisms was used in this investigation. The dispersion was determined with all possible care, using four kinds of light defined by spectral lines. It was found that light, on passing from iron, cobalt, and nickel into air, begins by following Snell's law for small angles of emission, the refractive index being mathematically defined as the limit of the ratio of sines when the angle of incidence approaches the limit zero. The dispersion in the case of each of the three metals mentioned was found to be anomalous.

Sir William Thomson, F.R.S., in a paper on an illustration of contact electricity presented by the multicellular voltmeter, called attention to the modification of the force between the aluminium needles and the brass cells of the instrument arising from the "contact electricity" difference between polished brass and polished aluminium. In the instrument as at present made, the observed difference of potential on reversal amounts to as much as ½ volt. Thus the use of the multicellular electrometer gives a new and very interesting direct proof of Volta's contact electricity.

Lord Rayleigh, Sec.R.S., read a paper on defective colour-vision, in which he pointed out that the existence of a defect is probably most easily detected, in the first instance, by Holmgren's wool test; but this method does not decide whether the vision is truly dichromic. For this purpose, Maxwell's colour-disks may be used. Lord Rayleigh found, in the case of some colour-blind persons he was examining, that it looked as though the third colour-sensation, presumably red, was defective, but not absolutely missing. When a large amount of white was present, matches could be made, in spite of considerable difference in the red component. But when red light was nearly isolated, its distinctive character became apparent. This view was confirmed by experiments with the colour-box.

Mr. J. Swinburne, in a paper dealing with the question of the production of high vacua, called attention to the great superiority of the Geissler over the Sprengel form of mercury pump.

Profs. Barr and W. Stroud, in a paper on the use of the lantern in class-room work, described a simple and convenient form of lantern for horizontal and vertical projection, and exhibited an apparatus for the preparation of lantern-slides in large numbers from books, periodicals, &c.

Mr. W. N. Shaw read a paper on the general theory of ventilation, with some applications, in which general laws of ventilation are established similar to Kirchhoff's laws relating to the distribution of currents in a network of conductors.

On Friday, September 5, there was a discussion on electrical units, opened by Mr. Glazebrook with a paper on recent determinations of the absolute resistance of mercury, in which he carefully compared and criticised the different methods employed by various observers. The best determinations of the ohm showed that it was very nearly indeed equal to the resistance of a column of mercury 106·3 cm. long and 1 square millimetre cross-section at 0° C. Mr. Glazebrook strongly advocated the adoption of the number 106·3 instead of 106; and Sir William Thomson, Prof. Rowland, Prof. Barker, and Mr. Preece expressed their concurrence in the desirability of the change.

Principal J. V. Jones followed with a paper entitled "Suggestions towards a Determination of the Ohm," in which he described the results of experiments undertaken at University College, Cardiff, in the spring of the present year. These experiments gave the ohm equal to the resistance of a column of mercury 106·307 cm. long and 1 sq. mm. sectional area. The method adopted was a modification of that due to Lorenz, in which a metallic disk is made to rotate in the mean plane of a coaxial standard coil. Wires touching the centre and circumference of the disk are led to the ends of the resistance to be measured, and the same current is passed through this resistance and the standard coil.

The features of special interest in the method employed were:—
(α) The employment of a long trough for holding the mercury; and, instead of measuring the distance between the electrodes, one electrode is kept fixed, while measurement is made of the distance moved through by the other between two positions of equilibrium of the galvanometer corresponding to two different rates of rotation of the disk. The latter measurement it is easy to make with accuracy, for the movable electrode may be rigidly attached to the movable headstock of a Whitworth measuring-machine placed parallel to the length of the trough; and the two equilibrium positions may be taken near the middle of the trough, so as to avoid danger of curvature in the equipotential surfaces passing through the electrode in its two positions. A new difficulty is, however, now encountered, viz. the determination of the section of the mercury column. The capillary depression at the sides of the trough would make it a most serious task to determine the section by direct measurements to the required degree of accuracy. This difficulty is overcome by a further differential method, viz. by making observations with the mercury at two different heights in the trough. The sides of the trough in that part of it traversed by the movable electrode are assumed plane, parallel, and vertical. The trough used in the experiments was cut in paraffin wax contained in a strong casting of iron with its sides strengthened by outside ribs. The channel was 43·5 inches long, by 1·5 inches broad, by 3 inches deep. Paraffin was found, however, not to be perfectly satisfactory, and Prof. Jones expressed the opinion that a trough of worked glass or scraped marble would have been preferable. The position of the mercury surface in the trough was determined electrically by using a pointed steel spherometer screw. The screw may be moved downwards until an electric circuit comprising the screw and the mercury is completed. (β) The employment of a brush of special form to secure good electrical contact at the periphery of the rotating disk. The brush consisted of a single wire perforated by a channel through which a constant flow of mercury might be maintained from a cistern of adjustable height. (γ) In connection with the measurements necessary to enable the calculation of the coefficient of mutual induction to be performed, Prof. Jones employs a coil consisting of only one layer of wire, the advantage of which is that every part is visible, and that nothing is done to alter the position of the wire after measurements have been made. If a coil consist of many layers, it is not quite easy to say where, after measurement, the lower layers go to under the pressure of the superincumbent ones.

In conclusion, the main suggestions offered for consideration, were:—

(1) That the time is ripe for a new determination of the ohm that shall be final for the practical purposes of the electrical engineer.

(2) That such a determination may be made by the method of Lorenz, the specific resistance of mercury being obtained directly in absolute measure by the differential method described.

(3) That the standard coil should consist of a single layer of wire, the coefficient of mutual induction being calculated by the formula given in the paper.

Sir William Thomson, in a paper on alternate currents in parallel conductors of homogeneous or heterogeneous substance, pointed out that when the period of alternation is large in comparison with 400 times the square of the greatest thickness or diameter of any of the conductors, multiplied by its magnetic permeability and divided by its electric resistivity, the current intensity is distributed through each conductor inversely as the electric resistivity; the phase of alternation of the current is the same as the phase of the electromotive force; and the current across every infinitesimal area of the cross-section is calculated, according to the electromotive force at each instant, by simple application of Ohm's law. Further, that when the period is very small compared with 400 times the square of the smallest thickness or diameter of any of the conductors, multiplied by its magnetic permeability and divided by its electric resistivity, the current is confined to an exceedingly thin surface-stratum of the conductors. The thickness of this stratum is directly as the square root of the quotient of resistivity, divided by magnetic permeability, of the substance in different parts of the surface. The dependence of the total quantity of electricity carried on extent of surface justifies Snow Harris, and proves that those who condemned him out of Ohm's law were wrong, in respect to his advising tubes or broad plates for lightning conductors, but does not justify him in bringing them down in the interior of a ship (even through the powder magazine) instead of across the deck and down its sides, or from the masts along the rigging and down the sides into the water.

Sir William Thomson read a paper on anti-effective copper in parallel conductors, or in coiled conductors for alternate currents. It is known that by making the conductors of a circuit too thick we do not get the advantage of the whole conductivity of the metal for alternate currents. When the conductor is too thick, we have in part of it comparatively ineffective copper present; but, so far as is known, it has generally been supposed that the thicker the conductor the greater will be its whole effective conductance, and that thickening it too much can never do worse than add comparatively ineffective copper to that which is most effective in conveying the current. It might, however, be expected that we could get a positive augmentation of the effective ohmic resistance, because we know that the presence of copper in the neighbourhood of a circuit carrying alternating currents causes a virtual increase of the apparent ohmic resistance of the circuit in virtue of the heat generated by the currents induced in it. May it not be that anti-effective influence such as is thus produced by copper not forming part of the circuit can be produced by copper actually in the circuit, if too thick? Examining the question mathematically, Sir William finds that it must be answered in the affirmative, and that great augmentation of the effective ohmic resistance is actually produced if the conductor is too thick, especially in coils consisting of several layers of wire laid one over another in series around a cylindric or flat core, as in various forms of transformer.

Prof. J. A. Ewing, in a most interesting and important communication (*vide Phil. Mag.*, September 1890), exhibited a model to illustrate some novel ideas on the molecular theory of induced magnetism. The present notion of a quasi-frictional resistance opposing the turning of the molecular magnets lends itself well to account for the most obvious effects of magnetic hysteresis and the reduction of hysteresis by vibration. On the other hand, it conflicts with the fact that even the feeblest magnetic force induces some magnetism. Reference was made to another (and not at all arbitrary) condition of constraint, which not only suffices to explain all the phenomena of hysteresis, without any notion of friction, but seems to have in it abundant capability to account for every complexity of magnetic quality. Prof. Ewing supposes that each molecular magnet is perfectly free to turn except in so far as it is influenced by the mutual action of the entire system of molecular magnets. A model molecular structure was exhibited, consisting of a large number of short steel bar-magnets strongly magnetized, each pivoted upon a sharp vertical centre, and balanced to swing horizontally. The bars swing with but little friction, and their pole-strengths are sufficient to make the mutual forces quite mask the earth's directive force when they are set moderately near one another. The group is arranged on a board which slips into a large frame wound round the top, bottom, and two sides, with a coil, through which an adjustable current may be passed to expose the group to a nearly homogeneous external magnetic force.

Sir William Thomson read a paper on a method of determining in absolute measure the magnetic susceptibility of diamagnetic and feebly magnetic solids. The method proposed consisted in measuring the mechanical force experienced by a properly shaped portion of the substance investigated, placed with different parts of it in portions of magnetic field between which there was a large difference of the magnetic force. A cylindrical or rectangular or prismatic shape terminated by planes perpendicular to its length was the form chosen; the component magnetic force in the direction of its length was equal to $\frac{1}{2}\mu(R^2 - R'^2)A$; where μ denotes the magnetic susceptibility, R R' the magnetic force in the portions of the field occupied by its two ends, and A the area of its cross-section.

Lord Rayleigh read a paper on the tension of water surfaces, clear and contaminated, investigated by the method of ripples. The ripples were rendered visible by a combination of Foucault's optical arrangement with intermittent illumination. Two frequencies were used, about 43 and 128 per second. The surface-tension of a clean water surface, in c g.s. measure, was found to be 74·0, thus confirming observations made with capillary tubes. Water saturated with olive oil had a surface-tension of 41·0, and saturated with oleate of soda a surface-tension of 25·0.

Mr. W. N. Shaw reported on the state of our knowledge of electrolysis and electro-chemistry.

Mr. J. Hopkinson read a paper on the inland compared with the maritime climate of England and Wales. For special reasons Buxton, Woburn (Apsley Guise), Croydon, Cheltenham, and Churchstoke were chosen to represent the interior of the country, while Scarborough, Lowestoft, Babbacombe, Worthing, and Llandudno were chosen to represent the sea-coast. The places were so chosen that the mean position, latitude, and longitude of the five inland places should closely approximate to those of the maritime. As the result of observations extending over the decade from 1880–89, he concluded that, so far as regards our comfort and most probably also our health, our maritime climate is on the whole superior to our inland climate, being warmer, owing (it is most important to observe) to the nights not being so cold, while the days are no hotter, the extremes of temperature being much less, the air rather less humid, the sky less cloudy, and the rainfall less.

Prof. Ramsay read a paper on the adiabatic curves for ether, gas and liquid, at high temperatures. The method adopted in the experiments was an ingenious one, and consisted in determining the velocity of sound in the vapour by Kundt's dust-figures, from observation of the wave-length and the pitch of the note emitted by the stroked tube containing the vapour. This process gives the ratio of adiabatic and isothermal elasticity from which the former elasticity can be calculated as the latter is known.

Prof. Ostwald read an interesting paper on the action of semi-permeable membranes in electrolysis, in which he gave an account of experiments upon the passage of an electric current through solutions in series separated by semi-permeable membranes, and pointed out the importance of such phenomena to physiology. He explained that a semi-permeable membrane would allow ions of one kind to pass through, but arrest ions of another kind, and thus act as though it were a metallic electrode.

Prof. C. Piazzi Smyth sent a paper on photographs of the invisible in solar spectroscopy. Two photographs were shown, each measuring 40 inches long × 20 inches high. They represent in reality, only very small portions of the faint ultra-violet of the solar spectrum, but on a whole scale of 57 feet long from red to violet; and are located quite outside the spectral limit of variability to the human eye, with the grating spectroscope concerned, whether under summer or winter sun.

Profs. Rücker and Thorpe contributed a paper on regional magnetic disturbances in the United Kingdom, and this was followed by a paper upon similar disturbances in France, by Prof. Mascart. A point of great interest in connection with these papers was the continuous nature of the disturbances extending from the one country across the Channel to the other.

Prof. Lodge, in a paper on electrostatic forces between conductors, gave an account of an investigation into the forces between electric resonators as examined experimentally by Boys, and therefrom branched out into several allied subjects connected with the mechanical forces of electric pulses and waves.

Prof. Fitzgerald communicated several papers on mathematical physics to the Section. One of these bore what would have been an attractive title, "An Episode in the Life of J," had it not been for a parenthetical addition, viz. "(Hertz's Solution of Maxwell's Equations)." It may be remarked that J has nothing to do with Joule or his equivalent, and that the episode referred to was not of the popular anecdotal type.

Mr. W. Barlow, in a paper on atom-grouping in crystals, called attention to some very interesting properties of the simpler kind of symmetrical grouping of points, and pointed out an easy and effectual method of studying them by using a model consisting of equidistant parallel planes of homogeneously distributed points represented by beads.

Mr. W. H. Preece read a paper on the character of steel used for permanent magnets. Samples of steel for the experiments were obtained from all the leading firms, and after magnetization were tested by a magnetometric method. The marked superiority of the Marchal magnets over those made of English steel is due either to the quality of the steel, or to the mode of tempering—most probably the latter.

Prof. S. P. Thompson read a paper on the use of fluor spar in optical instruments, in which he referred to the existing uses of fluor spar for experiments on radiant heat, and in the "apochromatic" microscope lenses of Zeiss. The latter application derives its importance from the extremely low dispersion relatively to the mean refractive power of the material. To these applications the author now added that of the construction of spectroscopic direct-vision prisms; and he described two prisms, both constructed for him by Mr. C. D. Ahrens—one consisting of a fluor prism cemented between two flint-glass prisms, and the second consisting of one Iceland-spar prism cemented between two fluor prisms. The former was considerably shorter than the ordinary direct-vision prism of equal power: the latter had the property of polarizing the light as well as dispersing it, and presented the novel feature of a true polarispectroscope.

Mr. F. T. Trouton read a paper advocating the introduction of a coefficient of abrasion as an absolute measure of hardness.

Mr. F. H. Varley exhibited and explained the action of a new direct-reading photometer—an ingenious and compact instrument, in which intermittent illumination is employed for equalizing the intensity of illumination from two sources of light.

BIOLOGY AT THE BRITISH ASSOCIATION.

ALTHOUGH the number of papers in Section D was not quite so large as usual, it was found sufficient to occupy the time fully. As on previous occasions, the most attractive part of the proceedings was a discussion on a subject of general interest arranged beforehand, and opened by set papers.

After the President's address on Thursday, Prof. Newton gave an interesting account of the ornithology of the Sandwich Islands, discussing its peculiarities and probable affinities. He showed that the fauna is now undergoing modification, and is in danger of extermination on account of the changes which are rapidly being made in the vegetation of the islands; and he urged strongly the necessity of making a thorough examination of the fauna and flora of this important region while it is still possible. This paper led to the appointment of a committee, with a grant, for the purpose of seeing that the necessary exploration was carried out at once.

The usual reports on the zoology and botany of the West India Islands, on the migration of birds, on the disappearance of native plants, on a deep-sea tow-net, on the Botanical Station at Peradeniya, Ceylon, on the Biological Laboratory at Plymouth, and on the Zoological Station at Naples, were read, and the committees were reappointed.

The greater part of Friday's meeting was occupied by an important and interesting discussion on the teaching of botany, and especially the teaching in schools or to the young. The subject was opened with papers by Prof. Marshall Ward, Prof. F. W. Oliver, and Prof. F. O. Bower. Prof. Marshall Ward discussed the teaching of botany under the three heads: (1) elementary or school teaching; (2) more advanced or academic teaching; and (3) applied or special botany, such as forestry. He urged strongly the advantages of an early training in botany, and showed the suitability of the subject for school teaching, not however from books, but practically, and especially by means of field-work. In the teaching of applied botany he considered that principles and generalizations were of more importance than masses of facts, even in the training of the so-called practical man.

Prof. Oliver treated chiefly of the teaching of elementary botany to medical students at our colleges; and Prof. Bower dealt also with the arrangement of the usual junior University course, which he considered should be wide in its range and suggestive, rather than more restricted and exhaustive.

A number of other teachers of botany joined in the discussion; and Dr. Forsyth, of the Leeds Higher Grade School, showed that many of the suggestions which had been made were being carried out at his school, where the pupils were taken periodically to the fields to collect the specimens for their object lessons.

Prof. Marsh then gave an interesting account of the Cretaceous mammals of North America, of which he had now in his possession over 1000 specimens, all obtained during the last year or so. These remains all appear to belong to the lower forms of Mammalia, such as Monotremes and Marsupials, and are all of small size, although they are found in the same beds with the gigantic Dinosaurs, such as *Triceratops*.

Prof. Denny gave an account of an abnormality which he had found in three successive seasons in some flowers of *Tropæolum*, and which consisted in the inversion and in some cases duplication of the spur. Prof. Denny suggested that these abnormal flowers seeemed to indicate that the spur was really the representative of the two missing stamens.

Canon Tristram contributed some notes on the natural history of Hierro and Graciosa, two outlying islands of the Canary Group. A paper by Mr. E. H. Hankin dealt with the modifying action of ferments, such as trypsin and pepsin, upon diseases caused by bacteria, *e.g.* anthrax. It is suggested that the injection of the ferment causes a "defensive proteid" to be formed and thrown into the circulation for the purpose of killing the bacteria.

On Monday, Prof. Miall and Mr. Hammond gave an account of the development of the head of the adult fly in the life-history of the dipterous insect *Chironomus*, commonly found in impure water. Prof. Marshall and Mr. Bles called attention to variability in development amongst allied animals, and even amongst individuals of the same species. Dr. P. H. Carpenter contributed notes on the anatomy and morphology of the Cystidea.

Mr. S. F. Harmer discussed the regeneration of lost parts in the Polyzoa, including the formation of new polypites in *Pedicellina* on the tips of the old stalks where no endodermal tissues are present. Dr. S. J. Hickson gave two papers on the Hydrocorallina—the one dealing with the meaning of the ampullæ in *Millepora murrayi*, which were found to contain modified dactylozooids bearing only very large sperm sacs; and the other being on the gonangia of *Distichopora* and *Allopora*. An important conclusion drawn from these investigations was that, as regards the position and character of the gonads, *Millepora* is not related to any of the Stylasteridæ.

Amongst a number of botanical papers read on Tuesday were: one by Mr. R. Warrington, showing that certain bacteria have the power, usually supposed to be peculiar to chlorophyll-bearing organisms, of forming organic compounds from inorganic materials; one by Prof. Bower, on the phylogenetic relationships between the different groups of Ferns; one by Prof. P. Geddes, on the origin of protandry and protogyny; and one by Dr. J. M. Macfarlane, on hybrids, in which it was shown from a number of genera of plants that certain hybrids which had been produced were intermediate, not only in appearance and general structure, but even in the most minute histological details, between the two parent species.

GEOGRAPHY AT THE BRITISH ASSOCIATION.

IN the quality and scientific value of the papers, this Section was considerably above the average of last year. There were only about a score of papers altogether, but the Organizing Committee had determined rather to be short of papers than to accept any of trivial importance. As it was, the time of the Section during the four days on which it met was well filled up. The sittings were well attended, and sometimes almost crowded; which is saying much, considering the size of the hall in which the Section met. The Section adopted a plan which answered admirably. It adjourned each day from 1 to 2 p.m., and invariably a good audience assembled for the afternoon meeting.

The hall was well filled at the President's address, which was an excellent *résumé* of the physical geography of the Mediterranean and the regions around its shores. On two other occasions the lower part of the hall was quite filled by audiences evidently greatly interested. First, on the Monday, when there was a joint meeting of Sections E and F to discuss the important subject of the Lands of the Globe still available for European Settlement. Mr. E. G. Ravenstein opened the conference with a paper giving what may be called the geography of the subject. He excluded from consideration the Polar areas, desert areas, and tropical areas unsuited to a European population. He showed that, dealing with the subject from a purely theoretical point of view, the population of the world, at the present rate of increase, would, in about three or four generations, amount to something like 5000 millions. This, of course, sounds very alarming, but as in the case of the prediction of the exhaustion of our coal supply, it was shown during the discussion that we may keep our minds at ease. Prof. Marshall, Sir Rawson Rawson, Dr. Cunninghame, Mr. Bourne, and others who took part in the subsequent discussion, mainly from the economical point of view, suggested various considerations in modification of those derived from the purely theoretical standpoint. The earth has still vast undeveloped resources; a more equable distribution of these among mankind is possible, and even desirable; the theoretical rate of increase will certainly be modified in various ways; the so-called deserts may, actual experiment has shown, be made, by means of irrigation from underground supplies, both fertile and habitable. The great truth which came clearly out of the discussion—a truth which ought to be widely realized now that tropical Africa is being opened up—is that European colonization, in the proper sense of the term, is impossible, so far as present experience goes, between the tropics. There are, no doubt, modifying circumstances in some cases, but these are rare. As usual in such discussions, there was a certain amount of irrelevant talk